GDF

GDF Report 2023

Delivering a solution for the most radioactive waste

Nuclear Waste Services

Contents

Foreword

By Chief Executive Corhyn Parr

Corhyn Parr
Chief Executive
Nuclear Waste Services

Nuclear Waste Services (NWS) is here to make nuclear waste permanently safe, sooner. And that includes the most radioactive waste destined for a Geological Disposal Facility (GDF).

With a view of the full waste management cycle, our skilled workforce is developing new treatment technologies and services to overcome the challenges of identifying and disposing of radioactive waste most appropriately and progressing the delivery of permanent disposal infrastructure, such as a GDF. By doing so, we will speed up the Nuclear Decommissioning Authority's (NDA) decommissioning mission and save the taxpayer money.

Our mission is to be the 'one-stop shop' for all radioactive waste management and disposal solutions for the UK – ensuring that the right waste goes in the right place ***(NWS strategy document)***.

The UK has been producing and managing radioactive waste for many decades and will continue to do so for many more. Nuclear power is viewed by the UK Government as essential to the green energy mix and a secure energy supply for all. The Welsh Government also supports new nuclear build. Therefore, the ability to safely manage nuclear waste today and for future generations is vital.

That is why we are delivering a GDF designed to be a safe and permanent solution for the UK's most radioactive waste.

It's a solution that is internationally accepted by governments and scientists. It involves isolating the waste deep underground, placing it in highly engineered vaults and tunnels, keeping the waste safe and secure over the many thousands of years it will take for the radioactivity to naturally reduce.

A GDF will only be built where we have the consent of a willing community with a suitable site.

While radioactive waste can be safely stored above ground, as it is today, this is not a permanent solution. These facilities require ongoing maintenance and protection from harm at the surface and will need to be rebuilt and the waste within them repackaged, given the very long timescales.

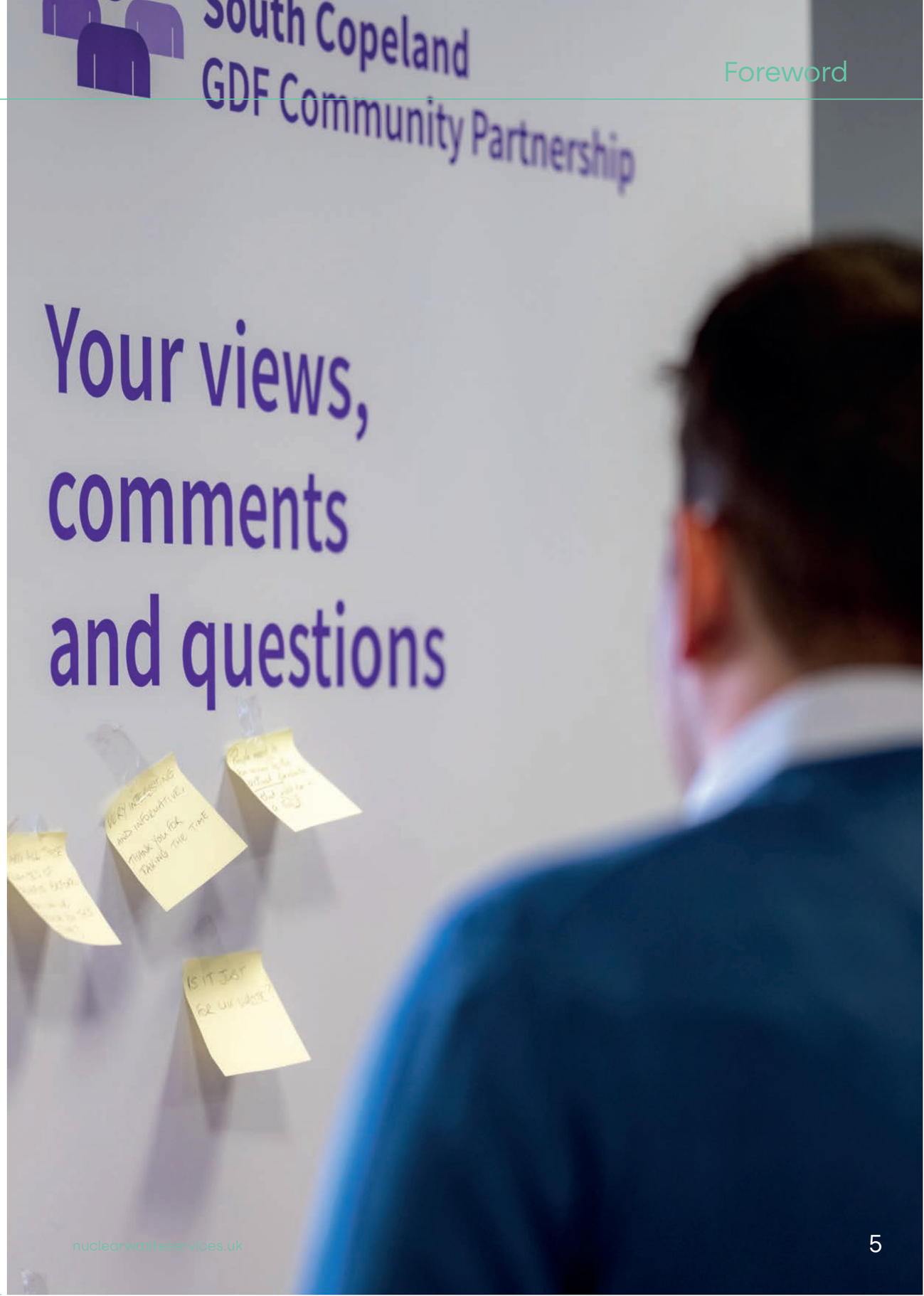
By working with the natural, long-term protection of a stable geological environment, a GDF ensures we remove the burden from future generations of having to keep the waste safe and secure in above ground storage facilities for many thousands of years.

A key aspect of the siting process now underway in England and Wales is that a GDF will only be built where we have the consent of a willing community with a suitable site. And, as well as protecting people and our environment, the GDF development also provides an opportunity to positively transform the host community for many generations.

Our ***GDF - Creating Jobs and Skills*** report, published in September 2022, highlighted that a GDF is projected to create thousands of jobs for more than a hundred years and provide opportunities for investment in local infrastructure, such as transport and flood defences.

This report provides an update on the GDF programme up to 31 March 2023. It highlights important areas of progress:

- We are now engaged with four communities across England: three in Cumbria, namely Mid Copeland, South Copeland and Allerdale, and one in Lincolnshire around Theddlethorpe, about what hosting a GDF could mean for them. Community Partnerships are now well established in these areas and provide a platform for sharing information and engaging with communities. It has been great to see the range of engagement activities tailored for communities, including partnerships with the youth sector, drop-in events, and GDF 'film nights'.



Looking ahead, we will continue our engagement with the existing Community Partnerships – and the door remains open for new communities to join the process.

- The formation of Community Partnerships has so far unlocked more than £3m of Community Investment Funding, supporting around 80 projects from community youth projects to mental health initiatives, and driving real positive change in those places. This means that there are clear benefits already to communities participating in the process.

- Our site evaluation work is moving forward. The first marine geophysical survey off the coast of Copeland, Cumbria, was successfully carried out in August 2022 – we expect the results to be available for sharing later in 2023. We have also purchased existing geophysical data for other search areas on both East and West Coast locations as an efficient and cost-effective way to get initial information on local geology.

We've also seen significant progress of international GDF programmes. There are more than 20 countries at different stages of GDF consideration and development around the globe, with Finland's GDF to start operating before the end of the decade, Sweden and France on track for the 2030s, and Switzerland set for the 2050s.

Looking ahead, we will continue our engagement with the existing Community Partnerships – and the door remains open for new communities to join the process. We continue to engage at national and regional events across the country to build awareness and understanding of this nationally significant project, and this has led to further interest which may in turn create new Working Groups in the coming months to open up discussions in other communities.

We're also preparing for future phases on the programme, developing NWS as the 'one-stop shop' for nuclear waste management and disposal, strengthening as a delivery organisation, building partnerships with the supply chain, and working towards major permissions required for a project of this scale and importance.

A GDF is a long-term project and we're making good early progress as we work to take responsibility for future generations.

Background

Overview

Over the last 70 years, nuclear technology has been a part of our lives in the UK. It provides around 15% of the UK's electricity and is used in industry, medicine, and defence.

Currently, the UK's most hazardous radioactive waste is treated and safely packaged in solid form and held safely and securely at over 20 surface storage facilities across the country. While these facilities are safe for the short to medium term, they require ongoing management and need to be rebuilt around every 100-150 years to ensure they continue to be safe and secure.

Today, nuclear power is viewed by the UK Government as essential to the green energy mix and securing our energy supply. The Welsh Government also supports new nuclear build.

Using our facilities and expertise, NWS will provide for the safe disposal of waste already created over the past 70 years.

We will also underpin the UK Government's ambition to ramp up nuclear energy capacity in the UK to up to 24 GWe by 2050 by preparing to safely dispose of future waste as well as existing waste, helping to secure clean, affordable, and reliable energy in the long term.

We have previously estimated that around 750,000 cubic metres of radioactive waste and nuclear materials could be destined for a GDF. That amounts to roughly two-thirds the volume of Wembley Stadium.

Using our facilities and expertise, NWS will provide for the safe disposal of waste already created over the past 70 years.

Inside Trawsfynydd ILW store

Scientists around the world agree that a highly engineered GDF is the best solution for the long-term management of our most hazardous radioactive waste.

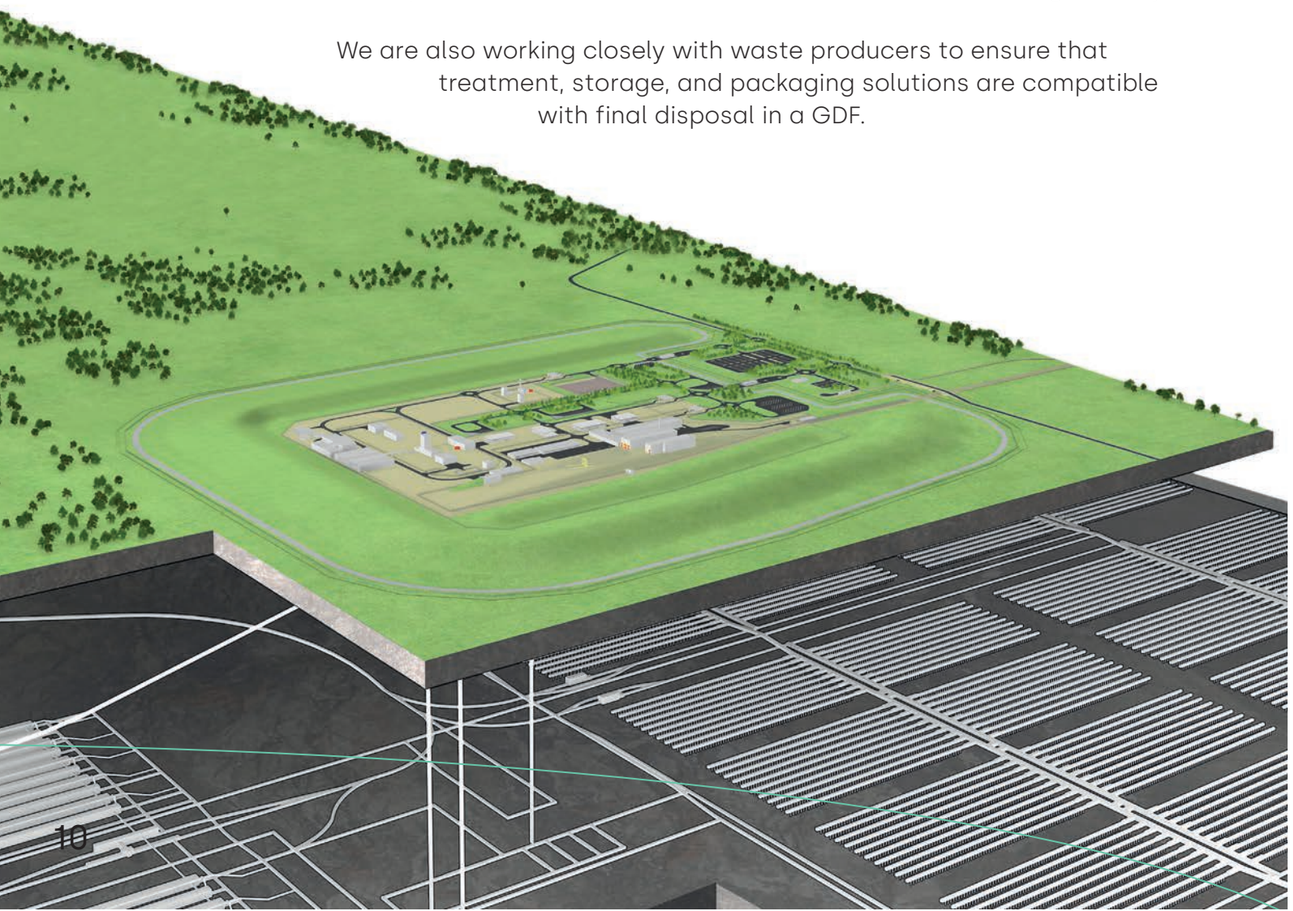
A GDF is made up of a series of highly engineered vaults and tunnels up to 1,000 metres below ground in a suitable rock formation. Combined with engineered barriers, this will protect the environment by keeping the waste isolated from the surface while the radioactivity naturally reduces to safe levels.

Under the current siting process for England and Wales, a GDF will only be built where there is a willing community and a suitable site. Positive early engagements are underway within communities across England about what hosting a GDF could mean for them.

This nationally significant infrastructure project is being delivered by NWS, which has expertise in areas such as nuclear science, engineering, and community engagement. NWS forms part of the NDA group, which has a collective long-term mission to clean up nuclear sites safely, securely, and cost-effectively.

Scotland has its own policy and NWS is working with the NDA and Scottish Government to help ensure that radioactive waste in Scotland is also managed safely.

We are also working closely with waste producers to ensure that treatment, storage, and packaging solutions are compatible with final disposal in a GDF.



Community engagement

Our approach to delivering a GDF, in line with government consent-based policy for England and Wales, is to find a community that is willing to host a GDF, and a suitable site.

The first step is engaging with people, groups, and organisations across the country to help them find out more about the opportunities this long-term investment programme could offer, so they can decide whether their community might be interested.

Setting up the longer-term Community Partnership will provide a platform to increase public engagement and help the community create a long-term vision for itself.

The next stage of the process involves the formation of a GDF Working Group. Working Groups are made up of individuals and organisations who approach us to consider whether a GDF could be located in the area, together with an independent Chair, independent facilitator, NWS, and others, such as Local Authorities from the area.

Establishing a GDF Working Group is just the starting point in a process that could take several years. Importantly, it does not mean that a GDF will be built in that location. The Working Group will identify and propose a search area for further consideration and engage people across the community to begin to understand their views.

The group will also recruit initial members for a GDF Community Partnership that could then take the process further, without initial commitment to hosting a facility.

A Community Partnership would need to involve at least one relevant Principal Local Authority (e.g. district, county, or unitary authority) from the Search Area. Setting up the longer-term Community Partnership will provide a platform to increase public engagement and help the community create a long-term vision for itself.

It also triggers up to £1m per year of Community Investment Funding (CIF). This funding is available for projects and initiatives that support economic development opportunities, improve community well-being, or enhance the local environment (including cultural and natural heritage).

This figure will increase to up to £2.5m per year if deep borehole drilling investigations are undertaken in that area. Every Community Partnership will also have access to independent advice to inform its thinking.

We will work with the communities engaged in the process to develop a positive and inclusive vision for the future. Significant Additional Investment would be made in a community that hosts a GDF, to enhance the significant economic benefits that are inherent in hosting a nationally significant infrastructure project and recognise the commitment from the community towards the national interest.

This investment could include improved local education and skills capacity, enhanced transport infrastructure, or improved recreational facilities. It will be additional to the CIF provided during the siting process and the investment and jobs that a major infrastructure project of this kind will bring to an area (more information in the 'Benefits and opportunities' section).

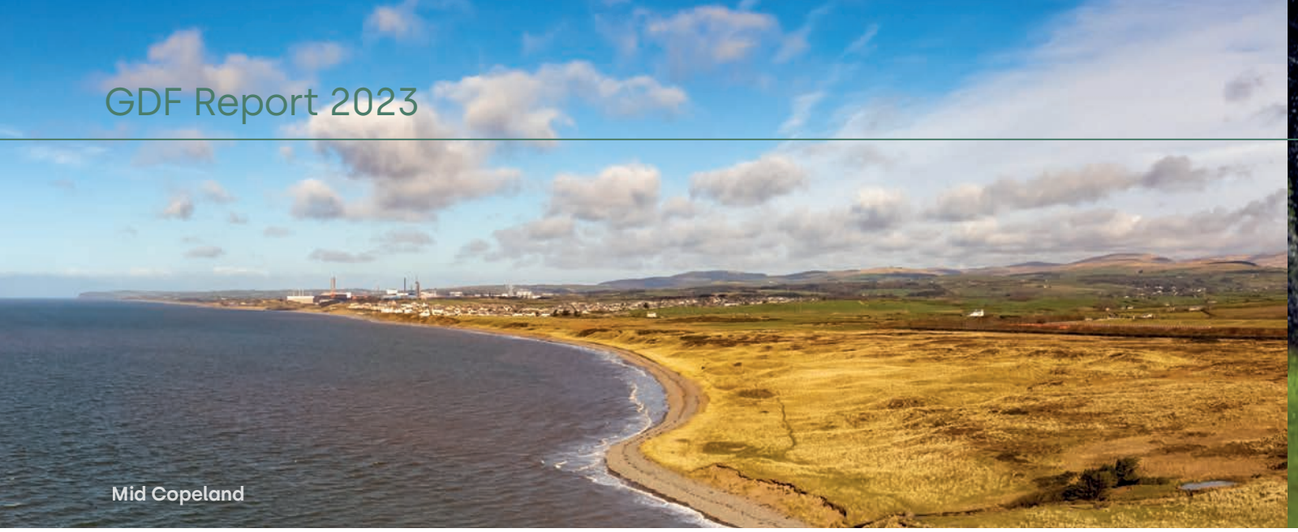
When ready, and once the community has had time to ask questions, raise concerns, and learn about a GDF through extensive community engagement, the relevant Principal Local Authorities on the GDF Community Partnership will decide on a timeframe for testing the willingness of the Potential Host Community for a proposed GDF development through a Test of Public Support.

If the residents of the Potential Host Community do not return a positive Test of Public Support, then the project cannot progress in that location.

A decision to withdraw from the process can also be taken at any time up until a Test of Public Support and must be agreed between the relevant Principal Local Authorities on a GDF Community Partnership.

If the residents of the Potential Host Community do not return a positive Test of Public Support, then the project cannot progress in that location.

NWS can also choose to withdraw from the process in particular communities as its investigations continue and it must narrow the options towards a final location. NWS will be transparent in its considerations to withdraw from a community and will honour any community investment funding commitments already made.


Mid Copeland


Theddlethorpe

Site evaluation and characterisation

In working with communities, one of the key tasks is to look for potential GDF sites. Detailed studies and investigations of site suitability will be conducted over a number of years to help ensure a GDF can be constructed, operated, and closed safely and securely.

NWS will evaluate each potential site to establish whether it is suitable, based on siting factors which include safety and security, community, environment, engineering feasibility, transport, and value for money.

We will initially carry out high level evaluations of Community Partnership Search Areas, including non-intrusive activities such as geophysical surveys and desk studies of existing data on the local geology, transport infrastructure and local power supply.

Much of the information at this stage will also be used to support Development Consent Order applications and the Environmental Permit applications for boreholes if a site is to progress to 'site characterisation' (more information in the 'Preparing for the future' section).

Certain decisions, specifically the decision on selecting which communities to progress to deep borehole investigation and the final site selection, will require approval from the Secretary of State.

As part of the site characterisation phase, NWS will conduct more detailed investigative work including surveys and the drilling of boreholes, to understand more about the geology deep below the surface where a GDF could be built.

The information gathered from these studies will be essential for applications to secure the necessary regulatory permissions to build a GDF and will be key in the development of a GDF design and safety case.

Timescales

Construction will only start on a GDF when a suitable site is identified, a Potential Host Community has confirmed its willingness to host the facility through a Test of Public Support, and all the necessary consents and permits have been obtained. These steps could take around 15 years.

The latest planning assumption is that a GDF will be available for intermediate level waste from around 2050-2060 and high level waste and spent fuel from 2075.

Filling a GDF with waste and then closing it, once full, will run into the next century.

Real progress

Identifying the location for a GDF is a process with the local community at its heart – and we have already established a dialogue within four communities across Cumbria and Lincolnshire, in the form of Community Partnerships, to explore whether hosting a GDF might be right for them.

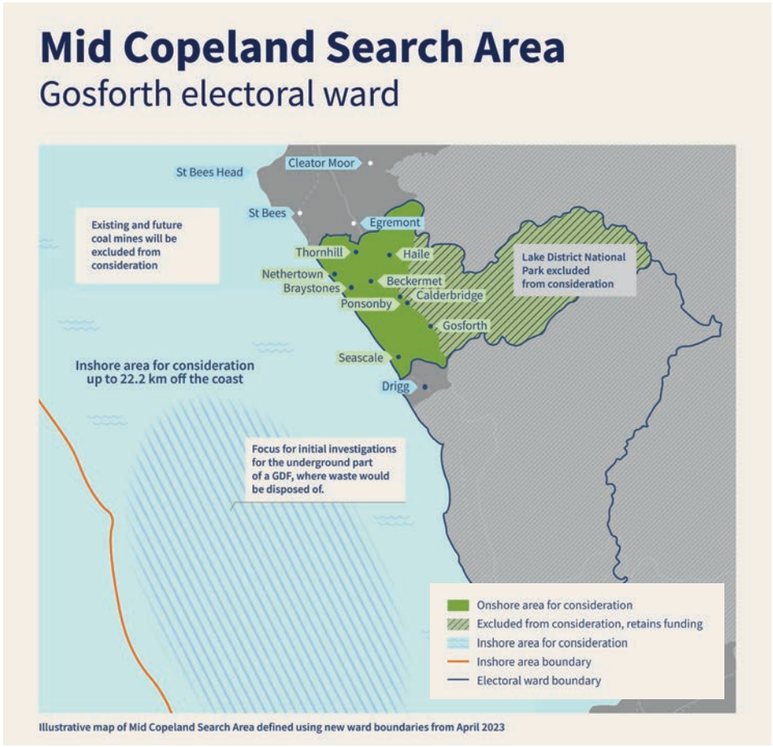
We are also continuing to talk to other organisations and individuals across England, which gives us confidence that more Working Groups and Community Partnerships could emerge.

Mid Copeland GDF Community Partnership

Mid Copeland GDF Community Partnership was the first to be formed in November 2021. Since then, it has awarded over £1 million in Community Investment Funding (CIF) to local projects. In many places that money has now been spent with new facilities opening, including an outdoor gym for Gosforth and a new play area in Beckermet.

The Partnership has 11 members so far, including residents and people with a background in working with young people, farming, and business.

During its first year, the Mid Copeland GDF Community Partnership held 50 events and had conversations with over 1,000 people. Those events and discussions continue, and a new quarterly newsletter is now delivered to local residents.



Illustrative map of Mid Copeland Search Area defined using new ward boundaries from April 2023

Working with the Mid Copeland GDF Community Partnership, NWS commissioned a marine geophysical survey to gather more information about the local geology off the coast where the deep geology is being considered for siting the underground elements of a GDF.

NWS has also started work on 10 initial studies in the area to help understand whether Mid Copeland could be suitable to host a Geological Disposal Facility. This work includes looking at issues such as labour and skills, local power supply and transport.

Andy Pratt, Chair of the Mid Copeland GDF Community Partnership, said:

"The aim of our Partnership is to share information, discuss concerns and find answers to questions for the community about what a Geological Disposal Facility could mean for our area. We're still early in the process but we've held over 50 events and had discussions with well over 1,000 people so far.

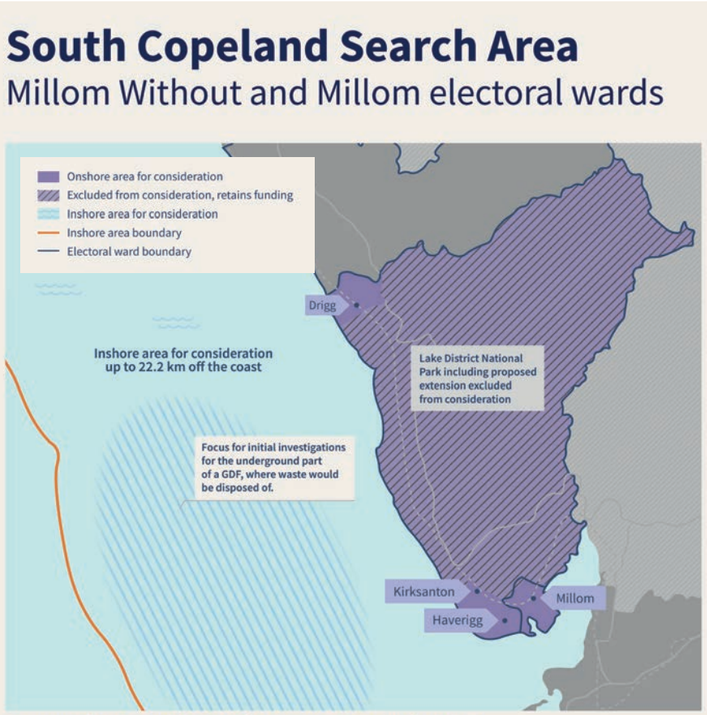
We really welcome the community coming along to these events and people can approach us any time with questions or concerns. We want to continue those conversations and listen to views – that's what we're here for."

South Copeland GDF Community Partnership

In December 2021, the South Copeland GDF Community Partnership was formed.

In its first year, the Partnership awarded £1 million CIF to local projects, aimed at providing economic opportunities, enhancing the natural and built environment, and improving community wellbeing in South Copeland. These projects include support for community 'first responders', school engagement programmes, mental health and addiction services, and sports and recreation facilities.

The Partnership has 12 members so far, including local authority representatives, Parish councillors, and local stakeholder groups, such as Friends of the Lake District.



Illustrative map of South Copeland Search Area defined using new ward boundaries from April 2023

There has been a range of community engagement activity, including a programme of events that took place in June 2022, attracting 200 people over four days in Millom and Haverigg. The Partnership has also attended local meetings and events such as the Agricultural Show, Parish Council meetings, National Skills Academy for Nuclear, and the British Energy Coast Business Cluster.

Leaflets and newsletters have been delivered to South Copeland's 5,086 homes, and e-bulletins are regularly shared with the Partnership's 644 subscribers.

South Copeland hosts its monthly meetings in public. It has also led a range of additional workshops and briefings, including a meeting with the Ignace Community Nuclear Liaison Committee (ICNLC) in Canada, Committee on Radioactive Waste Management (CoRWM), and the Environment Agency and Office for Nuclear Regulation, the independent regulators for environmental safety and for nuclear safety, security, safeguards and transport of radioactive waste, respectively.

The Partnership is now starting to look at further engagement plans and understanding how a GDF could support a community vision.

Like Mid Copeland, the marine geophysical survey undertaken in 2022 will provide detail on the area's suitability – and the site evaluation studies which have commenced will enable NWS to consider how different elements of a GDF could potentially be delivered in Copeland.

Ged McGrath, Chair of the South Copeland GDF Community Partnership, said:
"We are still in the early stages of what is a long-term programme and only just beginning to engage with our community, but in the coming months and years, we will speak to as many local people as possible, listening to views, answering questions, and raising concerns with the GDF developer as we investigate what it would mean to have a GDF here."

Allerdale GDF Community Partnership

Allerdale GDF Community Partnership was formed in January 2022.

Since then, it has awarded over £1 million in Community Investment Funding to 28 local projects, which include the provision of new pontoons in Maryport Harbour for the Maryport and Solway Sea Cadets and a 'Let's Talk Mental Health' conference organised by Cockermouth Rotary Club.

The Partnership currently has 11 members, including residents, council representatives, and people from local youth and business sectors.

During its first year, the Allerdale GDF Community Partnership held 40 face-to-face events, speaking with over 650 individuals; delivered 56,000 leaflets to homes in the Search Area; and produced four newsletters to 470 subscribers.

In July 2022 the Partnership held a workshop with 16 students from Energy Coast University Technical College to listen to the views of young people on matters relating to a GDF. This kickstarted a programme of engagement with young people.

A series of three further workshops were developed in partnership with Inspira, designed to listen to what young people think, and to give them a space for the Community Partnership to listen. The workshops were offered to all secondary schools, the college, and alternative education providers in the Search Area and sessions were booked with five different schools. The Partnership's Youth Engagement programme has continued to build momentum in 2023.

In late 2022, the Partnership began the process of identifying how they would go about creating a vision for Allerdale alongside the community. Over the coming months the Partnership will engage with the community to produce a vision statement which will help inform ideas for long-term investment.

Mary Bradley, Chair, said:

"As a Partnership, we have aimed to ensure people understand the project and any potential impact on local people by attending more than 40 meetings with local groups, holding exhibitions, attending discussions with Town and Parish councils and meeting with special interest groups."

Allerdale Search Area

Theddlethorpe GDF Community Partnership

In early 2022 the Theddlethorpe Working Group identified a Search Area, covering the electoral wards of Withern and Theddlethorpe, and Mablethorpe. This was followed by 12 information events that spring, before the Theddlethorpe GDF Community Partnership was formed at the end of June 2022.

Engagement activity has included a minibus tour - taking GDF exhibition material on the road - to local villages reaching 12 locations. The Partnership has also hosted four events called 'The Big Picture', which included Q&A sessions with a team of NWS experts and a selection of short films about a GDF.

In July 2022, the engagement team established a weekly 'drop in' at the Coastal Centre in Mablethorpe. This provided people with the opportunity to find out more about a GDF and ask questions in an informal setting.

Alongside the launch of the Community Partnership, the first issue of the quarterly newspaper, the *GDF Voice,* was delivered to all households in the Search Area.

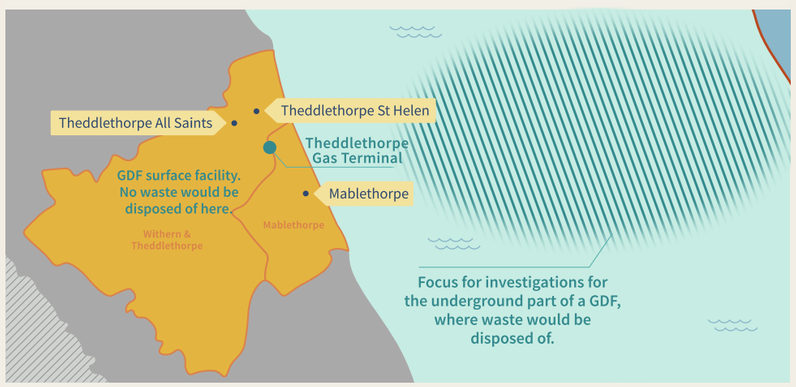
The Partnership has recruited 10 members so far, covering the sectors of local authority, voluntary and community, and business.

Members have identified the criteria for Community Investment Funding and are preparing to start awarding grants, to benefit the local area.

Jon Collins, Interim Chair of the Theddlethorpe GDF Community Partnership, said:
"The Community Partnership is important because it allows the potential for siting a GDF in an area to be explored and discussed in more detail. It enables local people to get involved, to ask questions and look at what a GDF built locally could mean for the area.

The Partnership is committed to ensuring that a full range of opinions are heard, and that the public are encouraged to get involved in the debate. To do this, the members of the Partnership need to reflect the community across all sectors including the voluntary and community sector, business sector and local councils."

Theddlethorpe Search Area



Research and evaluation

Our research activity guides our evidence-based approach to delivering a GDF. The work will inform the selection of a site for development and the facility's safety case and design.

We also support UK nuclear operations, decommissioning, and clean-up by evaluating waste owners' waste packaging proposals to ensure the waste packages will be suitable for safe disposal in a GDF in the future. The scale and complexity of the UK's Inventory for Geological Disposal, the need to develop appropriate multiple-engineered barriers and uncertainties in the natural environment are key factors requiring research.

In the last year these research needs were addressed by nearly 60 research projects.

A highlight was the first marine geophysical survey, focused off the coast of South and Mid Copeland, in August 2022. The survey was undertaken by specialists Shearwater GeoServices and acquired data over a period of around three weeks utilising the SW Bly, a 92-metre vessel carrying specialist acoustic equipment operating 5km-20km from the coastline.

The survey delivered good quality raw data with an exemplary safety and environmental record. This is an important step as we begin to understand the deep geology beyond the coast with the fully processed results expected towards the end of 2023.

In addition, two pre-existing deep boreholes at Rosemanowes Quarry, Cornwall, one 2km deep and the other 300m deep, were successfully sealed in September 2022 using innovative technology. This was part of a programme of research work to show that we have the necessary toolkit of approaches, procedures, and equipment to seal any boreholes we may construct in the GDF siting process.

Two pre-existing deep boreholes at Rosemanowes Quarry, Cornwall, one 2km deep and the other 300m deep, were successfully sealed in September 2022 using innovative technology.

The rig used in our borehole sealing project

While much of our research and development is delivered by our commercial supply chain and our international collaborations, about 10% will be delivered through the UK's world-class universities.

Our Research Support Office (RSO) was developed in 2020 to secure better value for money from our university interactions, as well as ensuring academia is well positioned to understand the GDF programme and to provide the next generation of specialists. The Research Support Office contract comprises a unique collaboration between the University of Manchester, University of Sheffield, and NWS.

In its first two years it has built participation across 17 UK universities and ten discipline areas, ranging from material science to social science, and geology to applied mathematics. The RSO is now supporting 33 PhD students and four post-doctoral research associates.

The SW Bly conducting a marine geophysical survey

International

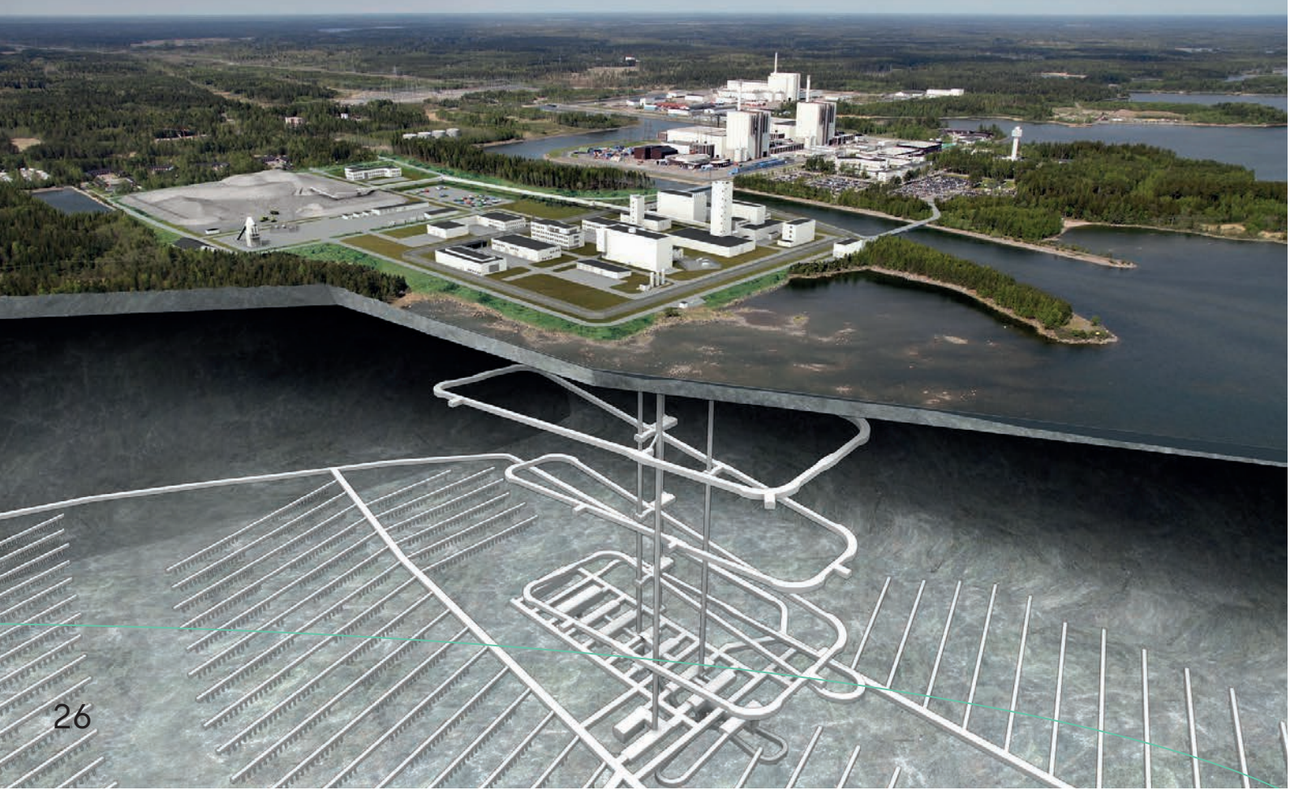
International partnership, collaboration and engagement is a critical enabler of our mission to successfully develop a GDF.

Our implementation of this approach is governed by international standards, guidance, and agreements, to manage safety and security risks.

We aspire to learn from, and promote, best international practice in consent-based siting, geosphere characterisation, waste packaging and facility design, to realise the safe and secure disposal of radioactive wastes, sooner.

Over the last year, we celebrated important advances in several international programmes.

- In Sweden, the government gave approval for construction of a GDF for spent nuclear fuel at Forsmark, in the municipality of Östhammar. This was the conclusion of a consent-led siting process initiated in 1992, eventually leading to a choice of two potential communities. The host rock at Forsmark is a granite formation over 1.9 billion years in age, at a depth of around 450m. GDF construction is expected to take around 10 years, once the necessary permits are obtained.



- In Switzerland, Nördlich Lägern was proposed as the preferred site for development of a GDF in a 175 million-year-old clay host rock at 800m depth. The Swiss GDF siting process was initiated in 2008, leading to identification of three candidate sites in 2015. Subsurface investigation, by invasive boreholes, established that it would be possible to construct a safe GDF at all three sites. Nördlich Lägern was determined to offer the greatest safety margin, due to the greater depth of the clay host rock, and more flexibility for the underground layout of the GDF. Subject to licencing and permits, first waste emplacement is expected in the 2050s.

- In France, our counterpart Andra applied for a construction licence to establish the Cigéo geological disposal facility at Meuse and Haute-Marne. The host rock for Cigéo is a 160 million-year-old clay formation, at a depth of around 500m, selected after more than thirty years of public debate and scientific investigation. First emplacement of radioactive wastes, in a pilot operation at Cigéo, is planned from 2035 onwards, subject to licencing and permits.

The achievement of these significant milestones in siting international GDF projects continues to strengthen and deepen the scientific and technical evidence base for geological disposal.

Dates on which selected international GDFs are scheduled to become operational:

Finland (Onkalo):
2024

Sweden
(Spent Fuel Repository):
early 2030s

France
(Cigéo):
2035

Canada
(NWMO):
early 2040s

Switzerland
(Nagra):
2050s

Our technical teams have continued to collaborate with international partners to advance our research and geological, engineering and site investigation capabilities and expertise, in support of our GDF programme.

In particular, our work in overseas underground rock laboratories enables us to undertake in situ experiments in relevant geological environments, over several years, under complex real-world conditions. For example, over the last year, we have continued our leading contribution to the international HotBent project, underway at the Grimsel Test Site, Switzerland. This full-scale field test aims to understand the performance of bentonite backfill at high temperature, and will continue until 2041.

The results from this experiment will enable us to determine whether the separation distance between heat generating waste packages can be reduced in our future GDF design. This could realise substantial savings in time and cost, without compromising safety in any way.

Our technical teams have continued to collaborate with international partners to advance our research and geological, engineering and site investigation capabilities and expertise.

Such experiments enable us to pool resources and expertise with international partners to address complex technical challenges, affording excellent value for money and outcomes.

Next year we will launch and implement an international engagement strategy, which will better focus the alignment of our collaboration and networking with programme needs and enable us to support a co-ordinated approach with the wider NDA Group.

The international HotBent project, underway at the Grimsel Test Site, Switzerland

Benefits and opportunities

A GDF will make a major contribution to the environment by safely and finally disposing of nuclear waste which otherwise would have to be stored and maintained for thousands of years above ground.

It is also one of the biggest infrastructure projects in the UK and will provide a major investment for the local host community and its economy.

The long-term nature of the project provides a unique opportunity to develop skills, expertise, and sustainable jobs for a local community.

Work on a GDF will carry on for about 175 years, generating an expected average of 2,000 jobs in any given year. During this time, it could provide significant additional investment and create thousands of extra jobs through increased business opportunities and the development of new or improved infrastructure and facilities across the region.

More than 4,000 jobs are set to be created during the siting and construction phases, which are expected to take in the region of 25 years.

Employment will be generated at the facility itself and in the supply chain, while attracting further investment in the local area. Most of the jobs created during construction and operation could and should be locally based.

Work on a GDF will carry on for about 175 years, generating an expected average of 2,000 jobs in any given year.

NWS is committed to recruiting locally where possible, and once a site is selected, roles would be available in a range of disciplines including engineering, science and technical, trades, operations, and business functions. 75% of roles are estimated to be for candidates with qualifications equivalent to A-Level or below.

The long timeframe means that education and training initiatives can be established to ensure local people have the best opportunities to develop relevant skills and qualifications. This project will provide a unique opportunity not only to recruit but also to upskill and reskill local communities, transforming the prospects of a region for generations.

As well as the early benefits of GDF Community Investment Funding, we will work in partnership with communities across the country, exploring the potential for them to host a GDF and the possible transformational benefits for the area. This could include better transport links, flood defences, education, healthcare facilities, broadband, or environmental improvements.

Costs

At this early stage, the total whole life cost of the programme, including the design, construction, operation, and closure of a GDF, is estimated to be in the region of £20-£53 billion.

The cost estimate takes account of uncertainty, optimism bias, and risk. Uncertainty will be reduced as we progress through the siting process and narrow down the options for a site. A greater understanding of the specific geology and associated engineering and technical requirements will allow us to refine our cost estimates.

The actual cost will also depend on the number of new nuclear projects that are developed in future and any additional waste from those stations.

The operators of new nuclear facilities will meet the costs of disposing of the waste they produce. The remainder of the costs will be met by the current waste owners, including the UK Government. The UK Government owns most of the legacy waste and is therefore responsible for the cost of its disposal in a GDF.

While radioactive waste can be safely stored above ground, these facilities require ongoing maintenance and protection from harm at the surface and will need to be rebuilt and the waste within them repackaged, given the very long timescales.

A GDF ensures we remove the burden from future generations of having to keep waste safe and secure in above ground storage facilities for many thousands of years.

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Preparing for the future

Alongside our community engagement and the progress being made in finding a willing community to host a GDF (see 'Real progress'), we are also taking important steps that will show us whether sites are suitable for a GDF.

As highlighted in this report, this site evaluation work is progressing. NWS' first marine geophysical survey off the coast of Copeland, Cumbria, has successfully acquired data, with findings to be published later in 2023. We also purchased existing seismic data for other search areas on both East and West Coast locations for information on their geology, which we expect to be published by 2024.

Wider site evaluation studies covering issues such as geology, labour and skills, and transport are also in progress.

The findings from our site evaluation work will inform our recommendation for approval by UK Government about the site or sites to be taken forward into the phase known as 'site characterisation'.

It is expected that two sites will be taken forward for this more detailed investigative site characterisation, which will include the drilling of deep boreholes to better understand the geology deep below the surface, where the underground part of a GDF would be built.

NWS is already preparing for the various environmental permits required from regulators to start the site characterisation work.

At key stages of the GDF programme, information is required to refine the safety case for a GDF. At the site characterisation phase, we must demonstrate to regulators that the planned boreholes will both gather sufficient information for the development of the safety case and won't hinder the safety of the GDF site.

In addition, certain types of projects in England which are considered by the UK Government to be nationally significant, need planning permission to be given at a national level, with consideration by the Planning Inspectorate and final approval by a Secretary of State. This is known as a Development Consent Order (DCO), and we're also making early preparations for our applications to the Planning Inspectorate.

The findings from our site evaluation work will inform our recommendation for approval by UK Government about the site or sites to be taken forward into the phase known as 'site characterisation'.

Theddlethorpe

The required permits, nuclear site licence, and DCOs are known as 'Major Permissions' for the GDF programme – and we're well placed thanks to the huge amount of work in ensuring the business cases, associated approvals, funding, planning, and procurement are all set up.

In parallel, we're building a strong team of experts to ensure we have the capability to procure and deliver all the work associated with evaluating potential sites for a GDF.

We know we cannot successfully deliver a GDF alone. The input, engagement, and collaboration from local communities already engaged in the process, our stakeholders, the supply chain, and our international colleagues are all vital as we make progress in delivering a GDF.

Allerdale

Where to find more information

You can find more information about NWS and geological disposal online or by contacting Nuclear Waste Services directly.

Information about the current GDF Community Partnerships

Mid Copeland GDF Community Partnership
midcopeland.workinginpartnership.org.uk

South Copeland GDF Community Partnership
southcopeland.workinginpartnership.org.uk

Allerdale GDF Community Partnership
allerdale.workinginpartnership.org.uk

Theddlethorpe GDF Community Partnership
theddlethorpe.workinginpartnership.org.uk

More from Nuclear Waste Services

About our organisation - nuclearwasteservices.uk

About a GDF - gov.uk/guidance/gdf-geological-disposal-facility

Twitter - @Nuclear_WS

You can subscribe for e-mail updates
public.govdelivery.com/accounts/UKNDA_RWM/subscriber/new

We also have a contact centre specifically for enquiries about the GDF programme
0300 369 0000 - gdfenquiries@nuclearwasteservices.uk

More from some of our key stakeholders

Nuclear Decommissioning Authority
Nuclear Decommissioning Authority - GOV.UK (gov.uk)

Committee on Radioactive Waste Management
Committee on Radioactive Waste Management - GOV.UK (gov.uk)

Environment Agency
gov.uk/guidance/regulating-the-geological-disposal-of-radioactive-waste-environmental-protection

Office for Nuclear Regulation
ONR - Geological disposal

Nuclear Waste Services

nuclearwasteservices.uk

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